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CURRENT LITERATURE.

BOOK REVIEWS.

German instruction in botany.

IT IS INTERESTING to compare the latest German book on botanical instruction with our own. Dr. KIENITZ-GERLOFF,[1] professor of botany in the Agricultural school at Weilburg, has briefly described the present condition of botanical teaching in Prussia; has discussed at some length the principles, pedagogical and botanical, on which a proper course should be laid out; and has devoted the greater part of his book to the outlining of such a course as meets his views.

The first section of the book may be passed over with the remark that "nature study" finds a place in the primary schools, but it is nature study directed to a somewhat definite end; for pupils are taught something of the structure and life of plants, and are even "made familiar with the use of the lens and microscope." This study is extended in the intermediate grades, and in the *Gymnasien* and *Realschulen* becomes a two to six-hour course weekly in natural sciences, continued for six years. Of this botany has a reasonable share. In the *Landwirthschaftschulen* (not technical schools) zoology and botany have four hours weekly for two years and two hours a week for a third, and applied biology has the same time.

In the second section the author with rather elaborate pedagogic philosophy develops his theory that the normal course of instruction in botany should be planned broadly on the lines that its historical development has followed. In the practical application of this theory he divides the course into four parts: (1) preparatory, (2) morphology and taxonomy, (3) physiology and anatomy, (4) cryptogams and reproduction.

In the preparatory course, no formal morphological distinctions are made, but the endeavor is to awaken interest, and to train in observation and induction by using the common and useful flowering plants. Incidentally, of course, a good deal of morphology is learned.

The second course, by using plants of the larger orders and families, and by comparisons, is for training in external morphology, and at the same time to give fundamental conceptions of taxonomy. The mere determination of names is made wholly incidental, and the memorizing of terms and definitions is rightly condemned. In both these courses actual examples of lessons (stenographically reported) are given.

The third course is given *in extenso* in the form of questions and a statement of the way in which pupils are to answer them, accompanied by many illustrations; so that this part of the book might almost be used as a guide for elementary plant physiology and anatomy.

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[1] KIENITZ-GERLOFF, F., Methodik des botanischen Unterrichts. 8vo. pp. viii+290. *figs. 114.* Berlin: Otto Salle. 1904. *M*6.50.

The fourth course begins with a somewhat detailed presentation of the bacteria, after which the book breaks off suddenly with a recommendation that pupils study a list of fourteen cryptogams, closing with the sexual reproduction of the phanerogams and a synopsis of the whole system.

There is much good advice and suggestion in Dr. KIENITZ-GERLOFF'S book, but like all such books it plans a course which is far beyond the possibility of execution in the time allowed. Naturally it demands a well-prepared teacher, and when once a school has that factor, the problem is practically solved. To such this book will be helpful if it does not suggest overcrowding. (And to everybody it would have been more helpful had a good index been provided.)

It is interesting to see that the ideals as to the content and method of botanical instruction in the higher schools in Germany and America are so nearly identical. But we fear Germany will long outstrip us in the practical application of these ideals unless superintendents are more alive to the necessity for the thorough training in botany of those to whom they commit such teaching.—C. R. B.

MINOR NOTICES.

POND[2] has been studying the relation of aquatic plants to the substratum. After an introduction and a historical résumé of the subject, he gives the details of a series of carefully conducted experiments on the growth of aquatic plants under different soil conditions. The plants experimented on were *Vallisneria spiralis*, *Ranunculus aquatilis trichophyllus*, *Elodea canadensis*, *Myriophyllum spicatum*, *Potamogeton obtusifolium*, and *P. perfoliatus*. The result of the experiments seems to prove clearly that these plants are dependent for an important part of their food on the substratum in which they are rooted; that there is an upward current through the plants; and that the roots serve not only for anchorage but also for absorption. He shows that most of these plants have root hairs through which absorption takes place. It is evident that the establishment of the fact of root absorption in aquatic plants is an important addition to botanical knowledge; but it has a wider and more important interest in connection with the problems of the relationships of the animals and plants in our lakes to each other and to their material environment. The introduction and the final discussion of the experiments serve to bring out very clearly the important bearing of these results on plankton problems. Without doubt most authors have supposed that aquatic plants draw their nutriment from the medium in which they live. This being the case, the general conclusion drawn by KOFOID, that submerged aquatics are accompanied by a relatively small amount of plankton, is easily understood. For if the plants draw their food from the water, there is less

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[2] POND, RAYMOND H., The biological relation of aquatic plants to the substratum. From U. S. Fish Com. Rep. for 1903.